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10CFR50.73

October 22, 2002

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Limerick Generating Station, Unit 1
Facility Operating License No. NPF-39
NRC Docket No. 50-352

Subject: LER 1-02-004, Unit 1 Reactor Enclosure Recirculation System Train Potentially Inoperable for a Period Exceeding the TS AOT


This Licensee Event Report (LER) addresses a Technical Specification (TS) violation that occurred as a result of the 1A train of the Reactor Enclosure Recirculation System (RERS) being adversely affected by deficiencies in a flow element and a flow controller instrument loop for a period that exceeded the TS allowable outage time (AOT).

Report Number: 1-02-004
Revision: 00
Event Date: August 23, 2002
Discovered Date: August 23, 2002
Report Date: October 22, 2002

This LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(i)(B) and 10CFR50.73(a)(2)(v)(C).

If you have any questions or require additional information, please do not hesitate to contact us.

Sincerely,



William Levis
Vice President - Limerick

cc: H. J. Miller, Administrator Region I, USNRC
A. L. Burritt, USNRC Senior Resident Inspector, LGS

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LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)

Estimated burden per response to comply with this mandatory information collection request, 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bis1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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TITLE (4)

Reactor Enclosure Recirculation System (RERS) Train Potentially Inoperable for a Period Exceeding the TS AOT.

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
08	23	2002	2002	004	00	10	22	2002	FACILITY NAME	DOCKET NUMBER
										05000
OPERATING MODE (9)		1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)							
POWER LEVEL (10)		100								
			20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)	
			20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)	
			20.2203(a)(1)		50.36(c)(1)(i)(A)		50.73(a)(2)(iv)(A)		73.71(a)(4)	
			20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)	
			20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER	
			20.2203(a)(2)(iii)		50.46(a)(3)(ii)		x 50.73(a)(2)(v)(C)		Specify in Abstract below or	
			20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)		in NRC Form 366A	
			20.2203(a)(2)(v)		x 50.73(a)(2)(i)(B)		50.73(a)(2)(vii)			
20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)						
20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)						

LICENSEE CONTACT FOR THIS LER (12)

NAME

Marino C. Kaminski, Manager – Experience Assessment

TELEPHONE NUMBER (Include Area Code)

(610) 718-3400

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
A	VA	FE	NA	Y	B	VA	FIC	L321	Y
SUPPLEMENTAL REPORT EXPECTED (14)						EXPECTED SUBMISSION DATE (15)			
YES (If yes, complete EXPECTED SUBMISSION DATE).						MONTH DAY YEAR			
X NO									

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

The 1A train of the Reactor Enclosure Recirculation System (RERS) tripped due to a low flow condition during monthly surveillance testing. The investigation identified that three issues when taken in combination, contributed to the train failure. The train flow element output was less than expected due to previous damage. The flow controller time-response was affected by the derivative (rate) setting, and high ambient temperature effects contributed to lower system flow. This condition existed for a period that potentially exceeded the TS AOT.

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NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

Unit Conditions Prior to the Event

Unit 1 was in Operational Condition (OPCON) 1 (Power Operation) at approximately 100% power. There were no structures, systems or components out of service that contributed to this event.

Description of the Event

On August 23, 2002, the Unit 1 monthly surveillance test (ST) was being performed on the Standby Gas Treatment System (SGTS) and Reactor Enclosure Recirculation System (RERS) (EIS:VA). At 01:55 hours, the 1A RERS fan (EIS:FAN) started and ran for approximately one-minute before tripping on an actuation of the low flow protective feature. The ST was then aborted and the 1A RERS train declared inoperable. Technical Specification (TS) 3.6.5.4 action "a" was entered which required restoration of the inoperable train within seven days. Corrective maintenance was initiated on the 1A RERS train.

Troubleshooting activities determined that the operating margin between the low flow setpoint and sensed system flow was inadequate to prevent inadvertent actuation of the low flow protective feature. The reduced operating margin was the result of the degraded flow element (EIS:FE) that has existed since January 9, 2001. A design change was implemented to decrease the low flow switch (EIS:FS) setpoint and reestablish the necessary margin. The train was returned to operable status on August 26, 2002 at 15:34 hours.

Following the August 23, 2002 low flow trip, a historical review was completed and it identified that the 1A RERS fan had tripped on low flow during the monthly ST on July 23, 2001 and also eleven months later on June 28, 2002. The other monthly tests were successful during this period. Following the July 23, 2001 trip, the flow controller (EIS:FC) was removed, tested and reinstalled. No failure was identified in the controller and the fault was assumed to have been corrected during the handling of the controller. The monthly ST was performed as the PMT and the train was declared operable. Following the June 28, 2002 trip, troubleshooting identified flow oscillations caused by a defective flow controller. The flow controller and chassis were replaced and successfully tested by performance of the monthly ST.

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The primary cause of the fan trip was the degraded condition of the flow element that occurred in January of 2001. The reliability of the train was adversely affected for a period of 20 months, exceeding the 7-day TS allowable outage time (AOT). During the affected period, the 1B RERS train was briefly inoperable for planned maintenance. The TS 3.6.5.4.b AOT for both trains of RERS inoperable is to be in HOT SHUTDOWN within the next 12 hours and COLD SHUTDOWN within the following 24 hours; therefore this TS AOT requirement was exceeded. TS 3.8.1.1 action "e" AOT was exceeded since D12 emergency diesel generator (EDG) was inoperable for a period that exceeded 84 hours during the D12 EDG 24-month inspection in May 2001. In addition, the safety function of the RERS system was potentially unavailable during the periods when 1B RERS was inoperable.

This event involved an operation or condition that was prohibited by the plant TS and a condition that could have prevented the fulfillment of the safety function of RERS. Therefore, this LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(i)(B) and 10CFR50.73(a)(2)(v)(C).

Analysis of the Event

There were no actual safety consequences associated with this event. The potential safety consequences of this event were also minimal.

The flow element is comprised of two pieces; a honeycomb flow-straightening grid and a pitot tube array. A review of historical data revealed the following. On January 9, 2001, the 1A RERS fan nose cone separated and damaged the flow element flow-straightening grid. Inspection and evaluation concluded that the damage observed would not adversely affect train operation. Following the latest train failure, system flow information was reviewed, and it was identified that sensed system flow was greater prior to the nose cone separation. Following the nose cone separation, sensed system flow has been lower. Recent inspection of the damage to the flow-straightening grid is believed to be indirect evidence that pitot array damage occurred when the nose cone separated.

Successful monthly testing occurred on 23 of 26 occasions between January 2001 and August 2002. However, it should be noted that all three previous fan trips occurred during periods of high ambient temperatures (June, July and August). During periods of high Reactor Enclosure ambient temperatures, air density is lower resulting in lower actual system flow during train operation. This resulted in further reduced margin between the trip setpoint and actual system flow causing the fan to trip. The correlation between variations in air density and the fan trips was not identified until the most recent event in August 2002. Tracking and trending of system flow was not being performed during the monthly STs. Therefore, the degraded flow element was not identified in a timely manner.

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A design change was implemented to lower the 1A RERS train low flow setpoint. The new setpoint maintains adequate low flow protection. On September 24, 2002, a modified controller was installed that further reduced the low flow trip setpoint and optimized the control settings by eliminating the flow controller derivative (rate) control function. This modification was performed to increase the operating margin to the low flow trip and to reduce the time to achieve full system flow following train startup. This design change only applies to the 1A RERS train.

Cause of the Event

The evaluation of the damage to the flow element did not identify the reduction in sensed flow following the fan nose cone separation in January 2001. This resulted in train operation closer to the low flow setpoint and an adverse effect on train reliability.

The flow controller derivative response adversely affected the time required to achieve system flow greater than the low flow trip setpoint upon system startup.

Corrective Action Completed

A design change was implemented that reduced the 1A RERS train low flow trip setpoint to a value that provides adequate low flow protection and operating margin between the setpoint and normal process flowrate.

A design change was implemented that improved the time-response of the 1A RERS flow controller in achieving rated system flow upon system startup.

The 1A RERS monthly ST now requires documentation of system flow, which will permit effective performance monitoring and trending.

Corrective Actions Planned

The degraded flow element on 1A RERS train will be inspected during the next unit refueling outage (1R10) in the spring of 2004 and repaired or replaced as necessary.

All monthly RERS STs will be revised to include documentation of system flow by November 15, 2002.

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NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

Previous Similar Occurrences

There were no previous occurrences of RERS failure due to degraded flow instrumentation.

Component data:

System: VA (Reactor Building Environ Control System)
Component: FE (Primary Element, Flow)
Manufacturer: (Air Monitor Corp)

System: VA (Reactor Building Environ Control System)
Component: FIC (Control, Indicating, Flow)
Manufacturer: L321 (Love Controls Corp)
Model: 541-8108-8115-8132